





# **Process and apparatus for producing highly charged large ions and an application utilizing this process**

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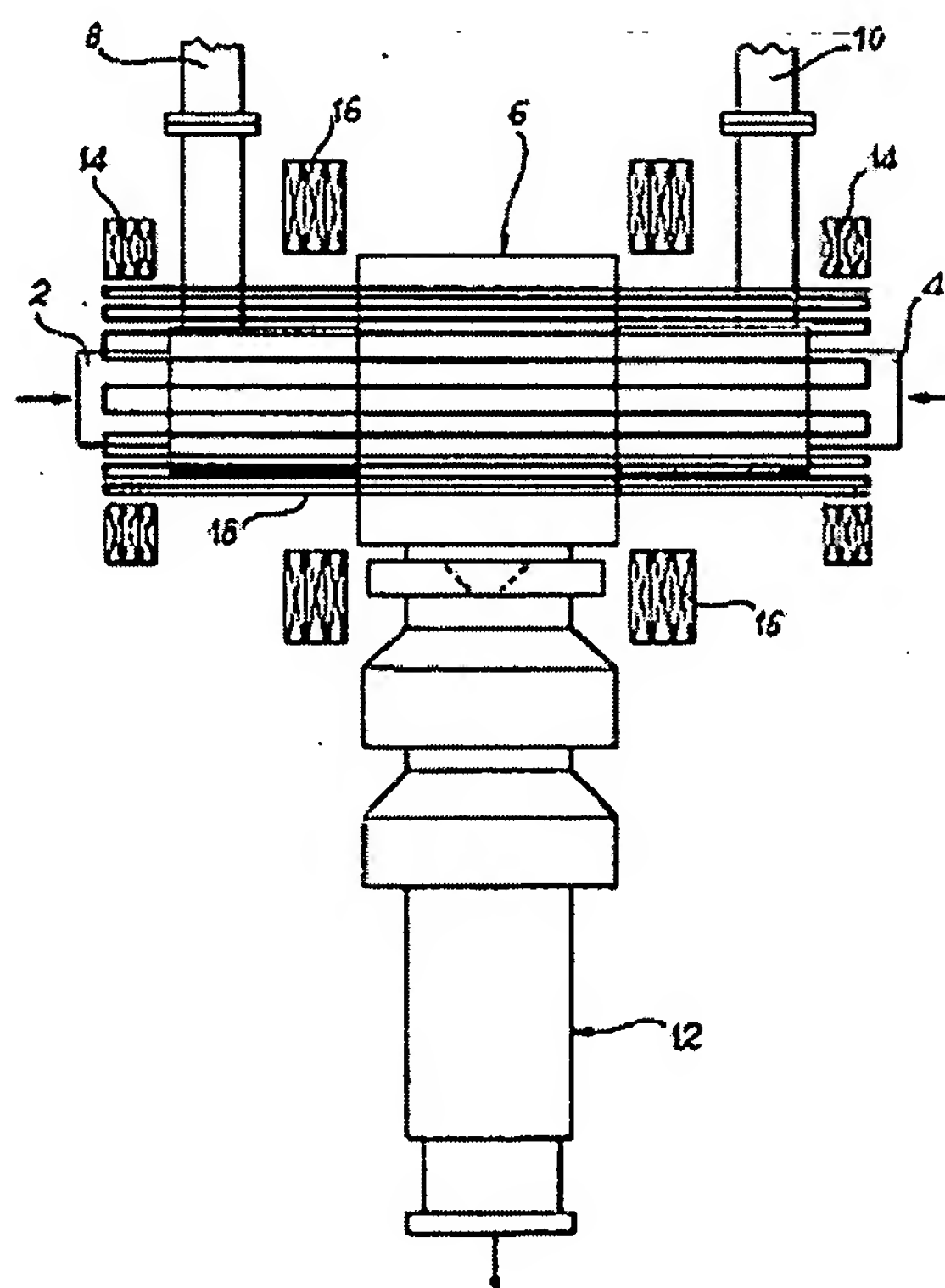
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**Process for producing highly charged ions** making it possible to ionize a gas of neutral atoms by electron impact, the gas being introduced into an ultra-high frequency cavity excited by at least one high frequency electromagnetic field which is associated with a magnetic field, whose amplitude is selected in such a way that the electronic cyclotron frequency associated with said magnetic field is equal to the frequency of the electromagnetic field also established in the cavity, the latter being provided with an opening for the extraction of ions by means of appropriate electrodes, wherein the said magnetic field is constituted by superimposing of a multipole radial magnetic field having a minimum amplitude in the central part of the cavity and a rotationally symmetrical axial magnetic field having a gradient along said axis, the resulting magnetic field being regulated in such a way that in the cavity there is at least one completely closed magnetic layer having no contact with the cavity walls, whereby on said layer the electronic cyclotron resonance condition is satisfied so as to obtain an ionization of the gas passing through it, the ions formed then being extracted through the extraction opening positioned in the vicinity of the outermost layer by means of extraction electrodes having no contact with said layer, followed by selection using appropriate means. Application to obtaining ions highly charged with rare gases.



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